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ABSTRACT

The description of a no-prerequisite, undergraduate engineering course entitled "Utilization of Waste Materials" is provided. The major component of the course, a student research project presented to the entire class, is explained. Topics of research which have been previously used by students are listed. Evaluation techniques and student comments concerning the course are also presented. (CP)

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AMERICAN SOCIETY FOR ENGINEERING EDUCATION

ANNUAL CONFERENCE, JUNE 16-19, 1975

COLORADO STATE UNIVERSITY

FT. COLLINS, CO. 80521

JUNK! WHO NEEDS IT?

(GENESIS: THE MISSING CHECKMARK)

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Regards!

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SE020 318

One of the many John Denver recordings is a delightful short ditty entitled simply: "JUNK" (1). The refrain goes:

Buy! Buy! says the sign in the shopwindow.
Why? Why? says the junk in the yard.

* * *

With that as an introduction I would like now to share with you some of my ideas and experiences after being involved in a course dealing with waste utilization. I have two reasons for doing this:

1. Perhaps you may benefit from my experiences, my techniques, my goals
2. I sincerely ask for your ideas and suggestions--based as they might be on your experiences.

In the past two years during our winter quarter some 20 students from a wide variety of curricula at Iowa State University registered for a 3-credit, no-prerequisite course, Ceramic Engineering 382X, entitled, "Utilization of Waste Materials". The "X" refers to the fact that it is an experimental course, which, depending on available

staff time and demand as evidenced by student enrollment, is a mechanism for introducing new courses into the curriculum.

The course description for 382X reads:

> "The magnitude of solid waste generation in the U.S. is such that successful waste management has become a rapidly developing technology. With mixed feelings, solid waste has been described as 'the Nation's most important raw materials resource'. Examples of industrial and urban waste generation and utilization are reviewed and problem areas are defined."

As you are aware, waste utilization or recycling or resource recovery is a many-faceted issue--germane to engineering, the physical sciences, and the humanities. The primary business of Ceramic Engineering 382X, however, is the practical application of engineering competence to the problem.

During the fall quarter--and well before the winter quarter preregistration deadline--I sent to all departments on campus a notice giving details of the course. To date, this has been the sole extent of advertising.

Of a total of about 30 class meetings for the entire quarter, I devote the first ten or so to a treatment of the subjects indicated in the Overview (See table.). Each student chooses a particular topic from the list of "Special Areas of Interest," researches the literature in as much detail as possible, prepares a Ditto master for duplication of hand-out material, and presents a 20-30 minute review and analysis to the rest of the class. Such presentations occupy the 20 or so remaining class meetings.

There are no examinations or quizzes. The final grade is a composite of:

1. attendance (three cuts allowed)
2. anonymous peer grade of each presentation
3. instructor grade of each presentation
4. grade assessing the degree of participation in the discussion period following each presentation.

Each student meets with me at least once before his or her presentation to discuss possible content and sources of information.

Table

An Overview

Materials and Man's Needs

Role of Materials in American Life

The Materials System

- Supply
- Use
- Recovery
- Disposal

Industrial and Urban Trends

Legislation

Special Areas of Interest

Aluminum	Mining wastes
Animal Waste	Paper
City of Ames	Plastics
Fly ash and slag	Rubber
Glass	Sewage
Junk cars	Textiles
Metals - ferrous	Thermal energy
Metals - non- ferrous	Waterborne wastes
Milling wastes	Case studies

The latter includes companies engaged in recycling efforts, the United States Environmental Protection Agency publications, and particularly local businessmen and University faculty who can provide current expertise with respect to the technologies, processes, and economics of waste utilization. Although the student is solely responsible for obtaining all information for a given presentation, I find that in order to advise and assist him effectively, it is imperative for me to keep abreast of current events in all aspects of waste management and utilization.

Thus far, I have primarily described mechanics. Now I would like to discuss what I see as the real reason for offering this course--and--incidentally, why there are no prerequisites, why the course is available to students from all disciplines.

What I hope to do is generate student reaction to the past and present role of materials in the American life style and--more importantly--to motivate my students to look into the future--because the future is theirs and their children's.

Twice during the quarter I formally invite student reaction to what they have heard in class and discovered in preparing for the presentations. I ask for four or five pages on how they view the relationship between their major program of study and the utilization of waste materials. I emphasize that use of our natural resources and utilization of waste materials is an area of concern requiring the efforts of almost every discipline.

At the end of the quarter we get together for a two-hour brainstorming session over Cokes during which we exchange ideas about how we as individuals in our present occupations can relate in a positive, practical manner to waste utilization and recycling. More than half of the students expressed a desire to follow-up this course in the spring quarter with a 2 or 3 or 4 credit course in which they could use the knowledge of their disciplines to generate an educational effort aimed at grade school, high school, or the general public. The possibility of this particular approach is being explored for the next school year. Almost every curriculum has a design or special

topics course for credit which might be utilized in this manner. Alternatively, the Environmental Studies Program at Iowa State University has the opportunity for research and independent study which allows the student to work with one or more staff members from various curricula in developing an interdisciplinary-interdepartmental project. I view the possibilities and potentials of such an undertaking as being limited only by the ideas and creativity of the students and faculty involved.

What is student reaction to this course on waste utilization? I found that they possess an almost naive conviction that the engineering and technological problems encountered in waste utilization can and will be solved. The major areas of concern emphasized the economic and sociological implications to a society in which waste management will play an increasingly important role. They voiced their implicit faith in education at all age levels as a means toward solving such problems. This may in part stem from the fact that they are themselves immersed

in the educational process. Here then are some student comments:

"...More than one generation of Americans have been raised in the throw-away disposable age; they have learned wastefulness as a way of life...

...For me the course started out as a grade. Now I feel like an activist. I bought my mom a trash compactor for Christmas so we don't have to burn anymore or clutter up a field. For myself, I'd say I've gained some insight into the problems and processes of recycling. It isn't as simple as giving your papers to the Boy Scouts...

...Recycling on an industrial level will be implemented in the United States only when it becomes economically feasible for a company to do so. While some companies might claim that their efforts are humanitarian oriented, the real gain they hope to realize is increased sales because of what people will <u>think</u> they are doing...

...I thought it would be interesting to me from a strictly educational standpoint. It has really made me realize that we do have a problem. I think I learned a lot about the pros and cons of recycling and was surprised to learn that in most cases it is not really economically practical yet...

...In order to promote recycling on the household level it will be necessary to transform our national human consciousness. This will take time and also some sort of economic impetus to get the ball rolling...

...In almost every major on campus there is someone who is concerned about the supply of materials in the world. To have a course that instills concern about recycling technology into the minds of these students could have a major impact when these students are out working. As it is set up right now, the course gives students a chance to learn about all areas of recycling and more important, to research an area of their particular interest...

...The only real way to change our society's beliefs is through education starting as soon as possible--in all grades from kindergarten through 12th and with courses offered in college for those who desire further knowledge...

...Education of society will not be a short term process. It will take a long time to establish habits and philosophies that promote recycling. Probably the best place to start in educating the public is with young children...they would grow into adults who would be willing and able to utilize the system...

...Before the young can be taught, the teachers must be taught...

...Get all the crazy and good ideas down because it's going to take some mixing of the crazy and practical to manage our trash..."

The 1974 COSMAT report (2) dryly noted:

"...Recent years have seen considerable interest in the idea that the earth's finite content of resources for industrial materials (including fuels) restricts severely the industrial growth that traditionally has been considered the basis of economic and societal health..."

Twenty years ago, Edward R. Murrow in a CBS radio documentary put it more forcefully (3):

"There never was a nation that consumed so much coal and steel and oil and copper and lumber and water and strange minerals and everything that comes out of the earth, and at the same time, gave so little thought to where it comes from. You may get a jolt to realize that although America is the land of plenty, the plenty is giving out."

Ceramic Engineering 382X will again be offered in the winter quarter of 1975/76. The students and I will again look at solid waste

management efforts by cities and towns, by industry and government. We will be exposed to the advances in engineering processes and technologies that de-ink newspaper, optically sort brown from clear glass, extract heat from burnable garbage, construct roads from glass and asphalt, and fabricate lightweight aggregate from fly ash collected from power plants. At the same time it will become apparent that more is involved than new technologies or new uses for waste materials; that sociological and economic factors must also be considered.

The "plenty" cited by Murrow has been managed by this and other countries for ages. And for ages a certain responsibility has tacitly accompanied that management. A single verse of Genesis (I:28) states it succinctly:

- ☑ Be fruitful, and multiply
- ☐ and replenish the earth,
- ☑ and subdue it:
- ☑ and have dominion over the fish of the sea,
- ☑ and over the fowl of the air,
- ☑ and over every living thing that moves upon the earth.

Ceramic Engineering 382X concentrates on the missing checkmark.

REFERENCES

1. From the album "Poems, Prayers, & Promises", RCA LSP-4499.

2. Materials and Man's Needs, Summary Report of the Committee on the Survey of Materials Science and Engineering, National Academy of Sciences, Washington, D.C., 1974, pages 20 and 21.

3. "Sound Advice from Yesteryear", Downs Matthews, EXXON, USA, Vol. XIII, No. 3, Third Quarter, 1974, pp. 22-27.